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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/940,178	08/27/2001	Toan Phan Vo	01-159	4414

7590 03/04/2004

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EXAMINER

BARRY, CHESTER T

ART UNIT	PAPER NUMBER
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1724

DATE MAILED: 03/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary	Application No. 09/940,178	Applicant(s) VO, TOAN PHAN	
	Examiner Chester T. Barry	Art Unit 1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 9/10/03; 12/15/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) 22-29 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16-21 and 37-39 is/are allowed.
- 6) ☒ Claim(s) 1-15 and 30-36, 40-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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Applicant's responsive arguments have been carefully considered.

Applicant's specification at page 6 describes a method for making the carbon adsorbent of claim 30. The examiner has summarized the main steps of this method at right.

<p>EXAMPLE 1</p> <p>Preparation of an iron-impregnated carbon adsorbent:</p> <p>3.6 ml of an aqueous ferric chloride solution (having a concentration of 100g ferric chloride in 40 ml water) was diluted with 40.3 g of deionized water. This solution was poured slowly into 50.0 g of oven-dried 12x30 mesh (U.S. sieve series) coconut shell-based PCB™ activated carbon (Calgon Carbon Corporation, Pittsburgh, Pennsylvania) contained in a pyrex glass dish. PCB™ activated carbon has a BET surface area of about 1050 m²/g and a micropore volume of about 60 cm³/100g. The impregnated carbon was stirred thoroughly while the solution was being poured into the carbon. The wet impregnated carbon was dried in an oven at 105° C for 2 hours based on the amount of ferric chloride solution used for the impregnation. The dried impregnated carbon had an iron content of about 7.9 % by weight of the carbon. The dried impregnated carbon was taken out of the oven and cooled down in a hood. A KOH solution was prepared by dissolving 12.47 g of KOH pellets in 60.02 g deionized water. The KOH solution was poured into the dried impregnated carbon. This amount of KOH was enough to completely wet the impregnated carbon without leaving an excess solution. The wet KOH-treated carbon was transferred into a 2000-ml beaker and the beaker was filled with deionized water. The water from the beaker was decanted and fresh deionized was added to wash potassium chloride from the impregnated carbon. This process of washing was repeated until the pH of the solution was about 7, as indicated by pH paper. The wet carbon was then dried in an oven at 105° C overnight. It was expected that the iron in the carbon would be in the form of ferric hydroxide. The dried ferric hydroxide-impregnated carbon was pulverized in a titanium vial containing tungsten abrading balls for testing of the removal of heavy metal anions. This impregnated carbon was identified as "3224-31-1."</p>	<ol style="list-style-type: none">1. Contact ferric chloride soln. w/ activated carbon adsorbent2. Dry impregnated adsorbent at 105 C for 2 hr.3. Add KOH solution to impregnated adsorbent4. Wash potassium chloride away until pH=75. Dry wet washed adsorbent6. Result: Ferric hydroxide impregnated carbon adsorbent
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USP 5432077 describes a similar process, but for the substitution of another base (ammonium hydroxide) for applicant's use of potassium hydroxide.

The method of the invention is preferably effected by reacting a substantially water-soluble salt of the polyvalent metal and a first anion with a substantially water-soluble compound comprising a cation and a second anion in an aqueous medium in contact with the adsorptive surface to form the precipitated salt of the polyvalent metal and the second anion in stable association with the adsorptive surface and a substantially water-soluble salt of the cation and the first anion.

Most preferably, the adsorptive surface is first intimately wetted with an aqueous solution of the salt of polyvalent metal and first anion. The adsorptive surface with adsorbed aqueous solution is thoroughly dried and subsequently wetted with an aqueous solution of the compound comprising the cation and the second anion whereby the precipitated polyvalent metal salt is formed in stable association with the adsorptive surface.

Alternatively, the adsorptive surface is first intimately wetted with an aqueous solution of the salt of polyvalent metal and first anion and subsequently contacted with vapors of a reactant material, i.e., ammonia, which, upon dissolution in the aqueous solution, forms the compound comprising the cation and second anion.

The adsorbent material containing precipitated salt is finally dried to produce a filter which may be used repeatedly in purification procedures. Surprisingly, it has been found that drying the filters does not deleteriously affect the stability of the bond between the salt and the adsorbent surface.

After the adsorptive material has had sufficient time to adsorb the soluble polyvalent metal salt, the material is removed from the solution. The support is drained of excess solution and either blotted dry or allowed to air dry overnight. Better results have been obtained using the latter drying procedure. The draining and drying steps are important in that they ensure that only solution that is tightly associated with the adsorptive material will be retained through these steps. Next, the dried adsorptive material is treated with a solution or vapors of the precipitate forming compound. Following precipitation with ammonia gas or ammonium hydroxide, the support material is allowed to dry and then washed with buffer or water before use. Following precipitation with an aqueous solution of precipitate forming compound, the material is washed with deionized water to remove residual base and dried. The resulting precipitate forms within and throughout the adsorptive material and is tightly bound to the surface and does not merely loosely coat the surface.

Where the salt to be formed in situ is an oxide, it is preferred to coat the adsorptive surface with a water-soluble polyvalent metal salt, preferably from an aqueous solution (followed by drying) and subsequently heating the coated substrate to convert the soluble salt to the water-insoluble polyvalent metal oxide. The temperature to which the soluble salt is heated to convert it to the oxide will depend, of course, upon the identity and nature of the water-soluble salt and is easily determinable by those skilled in the art without undue experimentation.

Granular activated carbon (Matheson-Coleman-Bell, Inc.) was soaked in solutions of ferric chloride, calcium chloride, or magnesium chloride for one week. The combinations and concentrations of salts used are set forth in Table 5 below. The carbon was removed from the solutions, dried overnight at 35° C., and then soaked for 48 hrs. in 5N ammonium hydroxide. The carbon was removed from the ammonium hydroxide solution and dried overnight at 35° C.

Accordingly, the prior art Farrah method may be summarized as follows:

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1. Contact ferric chloride soln. w/ activated carbon adsorbent¹
2. Dry impregnated adsorbent at 35 C overnight
3. Add 5N NH₄OH solution to impregnated adsorbent for 48 hr.
4. Wash w/ DI water

Following precipitation with an aqueous solution of precipitate forming compound, the material is washed with deionized water to remove residual base and dried.

5. Dry wet adsorbent overnight at 35 C.
6. Result: Ferric hydroxide impregnated carbon adsorbent

The skilled artisan would not have expected the nature of the properties of the resulting prior art ferric hydroxide impregnated activated carbon adsorbent to have differed from those of the adsorbent resulting from applicant's Example 1 notwithstanding slightly different processing conditions and the substitution of one base, ammonium hydroxide, for the potassium hydroxide used in applicant's process. Accordingly, to the extent that applicant's ferric hydroxide impregnated carbon adsorbent is capable adsorbing heavy metal anions, the prior art ferric hydroxide impregnated adsorbent described by Farrah is inherently also capable of adsorbing heavy metal anions. See Titanium Metals Corp. v. Banner, 227 USPQ 773 (CAFC 1985).

Accordingly, claims 30 – 36, 8 - 15 are rejected under 35 USC Sec 102(b) as anticipated by Farrah.

¹ The activated carbon described in Farrah appears to have a surface area of at least 100 m²/g. USP 5965483 reports

Per claim 33, the recitation of this claim merely narrows the scope of the intended use of the claimed product and does not further limit the product per se. As for the capability to adsorb heavy metal anions wherein the heavy metal is arsenic, selenium, or combinations thereof, if the applied-for material has that capability, the prior art material inherently possesses that property as well insofar as the methods employed in making the prior art material and that disclosed in the pending specification are so strikingly similar.

Per claim 35, the claimed method of making the iron(III) hydroxide impregnated carbon adsorbent is detailed above. The mere intended use ("for use in removing ...") of a product ("carbon adsorbent") is non-limiting of the method of making the product (claim 35).

Per claims 8 – 21, Farrah describes activated carbon impregnated with "ferrous hydroxides" and "aluminum hydroxides" (col 3 line 59).

Claim 40 – 41 are rejected under 35 USC Sec 102(b) as anticipated by Farrah. The discussion of Farrah is incorporated herein by reference. In addition to description of impregnation of various preferred insoluble compounds in the carbon adsorbent, as set forth below:

that typical commercial activated carbon has a surface area of at least 300 m²/g.

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The insoluble salt formed may comprise, e.g., hydroxides, phosphates, chromates, oxides, peroxides, etc.

Particularly preferred salts include ferric and ferrous hydroxides, aluminum hydroxides, magnesium hydroxide, oxide and peroxide, lead chromate and calcium hydroxide.

Farrah also teaches that any polyvalent Group IB metal can be used:

The salts are preferably formed from polyvalent metals of Groups IB, IIA, IIB, IIIA, IVB, VIB, and VIII. Particularly preferred are iron, aluminum, lead, magnesium, silver, calcium and mixtures or alloys thereof.

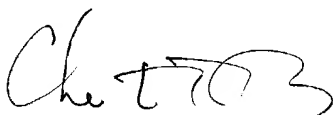
Copper is a polyvalent Group IB metal. Accordingly, Farrah describes a process of using copper chloride or other soluble salt followed by treatment with a hydroxide to impregnate insoluble copper hydroxide in the carbon adsorbent.

Per claims 1 – 7 are rejected under 35 USC Sec. 102(b) as anticipated by Farrah. The examiner relies on Farrah's disclosure of aluminum hydroxides impregnated on carbon adsorbents.

CNB Claims **16** – 21, ~~30-39~~ are allowed.

Claims 22- 29 are withdrawn.

Respectfully,



571-272-1152

**CHESTER T. BARRY
PRIMARY EXAMINER**